



UNIVERSITY OF ESWATINI
Faculty of Health Sciences
Department of Environmental Health Science

BACHELOR OF SCIENCE IN ENVIRONMENTAL
MANAGEMENT AND OCCUPATIONAL HEALTH

2021 FINAL EXAMINATION

TITLE OF PAPER : SAFETY MANAGEMENT IN MINES
COURSE CODE : EHS 439
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS

1. Read the questions & instructions carefully
2. Question 1 is compulsory
3. Then answer ANY OTHER three (3) questions
4. Each question is weighted 25 marks
5. Write neatly and clearly
6. Begin each question on a separate sheet of paper
7. Numbering within a chosen question should be in a sequential order
8. BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

**DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY
THE INVIGILATOR.**

QUESTION 1

This is a multiple choice question, only write the number and letter of the most correct response. E.g. 1.1 = X. Each response carries 1, 2 or 3 marks.

1.0 What two gases that are found in a coal mine that is non-explosive? (2)

- A. CH₄ and CO
- B. CO₂ and CH₄
- C. CO₂ and N₂
- D. CO and N₂

1.1 Which explosive gases are found in bituminous coal mines? (3)

- A. CH₄, CO, and H₂S
- B. CH₄, N₂, and CO
- C. CO₂, CH₄, and N₂
- D. H₂S, CO, and SO₂

1.2 The flame in a flame safety lamp will _____ when black damp is encountered. (1)

- A. Burn brighter
- B. Go out
- C. Turn blue

1.3 Stink damp refers to _____ (1)

- A. H₂
- B. H₂S
- C. SO₂

1.4 What is the explosive range of Hydrogen Sulfide? (2)

- A. 4.3% to 45%
- B. 12.5% to 74%
- C. 5% to 15%

1.5 Is sulfur dioxide combustible? (1)

- A. Yes
- B. No

1.6 How is sulfur dioxide formed in a mine? (1)

- A. by burning coal containing pyrites
- B. by charging batteries underground
- C. it is a by-product of methane

EHS439 SAFETY MANAGEMENT IN MINES

1.7 What mine gas can be detected by odor? (1)

- A. Sulfur dioxide
- B. Hydrogen sulfide
- C. Hydrogen dioxide

1.8 What does the presence of CO in a sealed mine indicate? (1)

- A. Large amounts of water
- B. Methane liberation
- C. A fire

1.9 Where might accumulations of carbon dioxide be found? (1)

- A. Along the roof line
- B. Near the floor at inadequately ventilated places
- C. Near standing bodies of water

1.10 A greater percentage of methane is necessary to start an explosion in an atmosphere which contains less than the normal percentage of oxygen (1)

- A. True
- B. False

1.13 What effect does the presence of CH₄ have upon the explosibility of coal dust? (1)

- A. The coal dust is ignited less easily.
- B. The coal dust is more easily ignited and the force of the explosion is greater.
- C. Methane does not affect the explosibility of coal dust.

1.14 _____ is a flammable mixture of methane and air which can either burn or explode when ignited (1).

- A. Whitedamp
- B. Firedamp
- C. Stinkdamp

1.15 A sealed area of a coal mine after a period of time will be found to have the absence of _____ (1)

- A. Nitrogen
- B. Oxygen

EHS439 SAFETY MANAGEMENT IN MINES

C. Carbon dioxide

1.16 The term black damp means _____ (1)

A. Moist air in a coal mine

B. Oxygen deficient

C. After effects of a mine explosion

1.17 Methane can be detected by _____ (1)

A. Chemical analysis

B. CH_4 detector

C. All of the above

1.18 When a methane explosion unites with coal dust, it becomes less violent (1)

A. True

B. False

1.19 In a mine environment, methane is most likely to be found _____ (2)

A. Near the bottom

B. Near the roof

C. In return areas only

1.20 How does oxides of nitrogen cause death? (2)

A. Cause fluids to be built up in the lungs

B. Combines with hemoglobin in the blood

C. Creates air embolisms in the bloodstream

QUESTION 2

- a) In order for a gas to explode, there are some parameters that should be present, what are these parameters? (6)
- b) How does the knowledge of Specific Gravity help in the understanding of gases behaviour in the mine? (6)
- c) How do light and heavy gases stratify in the mine? (4)
- d) What are the legal requirements that each mine rescue station should have in relation to gas detection? (6)
- e) Write briefly about lignite coal (3)

QUESTION 3

- a) Outline the other methods that may be applied in order to control Acid Mine Drainage (10)
- b) List the minimum equipment required to ensure adequate first-aid treatment in a mine (12)
- c) Why is it discouraged for workers in a mine to be offered carbonated or caffeine containing drinks? (3)

QUESTION 4

- a) If there is a fire outbreak in the workplace, what should the responsible officer do at the Assembly point? (6)
- b) What is syngas and how is it obtained? (3)
- c) What are the common health hazards that may be encountered in the coal mine industry? (8)
- d) Differentiate between a rescue pack and a fresh air base (4)
- e) The most important sources of ignitions in a coal mine fall into six main classes. What are these classes (6)
- f) Define what tailings are (1)

QUESTION 5

Write short notes on these 5 key stages of a coal mine (25)

- a) Prospecting
- b) Exploration
- c) Development
- d) Exploration
- e) Reclamation